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ABSTRACT

Effective individualized learning continues to be the primary educational goal of small-rural schools. Three thrusts towards individualized learning--non-graded instruction, an emphasis on basic skills, and socially relevant education--can be enhanced by instructional computing, the use of microcomputers to facilitate learning. However, most approaches to instructional computing have not yet proved effective and instructional computing has not achieved widespread use and acceptance. The unique attributes of microcomputers (such as interaction, color graphics, voice input, and touch sensitive screens) should be adapted to the process of teaching and learning. The quality of instructional software should be improved with standards that reduce the focus on computer games and increase the focus on providing the learner with new content in an emotionally healthy and appropriate environment. Instructional software should include monitoring trails, be accurate, be carefully field-tested, incorporate heightened sense appeal, and provide learner control. Some of the ambiguities of instructional computing (such as the educational value of video games; the values implicit in drill, practice, and review; the use of computers in homework assignment and review) should be resolved. Finally, educators should join with computer scientists to develop standards, models, and procedures for instructional computing. (SB)

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IMPROVING LEARNING IN RURAL SCHOOLS THROUGH INSTRUCTIONAL COMPUTING

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ABSTRACT

This paper suggests that a revitalization of small-rural schools may be on the way, spearheaded by instructional computing. The objective of individualized learning may finally be within the reach of rural school educators. The use of microcomputers to facilitate learning is described. Four major recommendations with supportive rationale are suggested:

1. The unique attributes of the microcomputer should be adapted to the process of teaching and learning;
2. The quality of instructional software should be improved by insisting on educational standards;
3. Some of the ambiguities of instructional computing should be resolved; and
4. Educators should join with engineers and computer scientists in order to develop standards, models, and procedures for instructional computing.

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Improving Learning in Rural Schools

Through Instructional Computing

Dr. Daniel Friedman, President

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Introduction

Effective individualized learning continues to be the primary educational goal of our small-rural schools. The roots of individualized instruction were developed in the non-graded one room schoolhouses of our past. Teaching the three R's and basics have always been held in high esteem in our country schools. The integration of learning with applications in society has been sought vigorously. These three thrusts towards individualized learning: non-graded instruction, an emphasis on the basics, and socially relevant education may now be joined, enhanced, and extended by instructional computing.

The development of large computers over the past thirty years had limited impact on schools in general and even less significance for the small rural schools of our nation. The financial costs associated with early computers and their limited instructional value for rural schools guaranteed that they would not be used widely. But the overwhelming problem was that the educational promises far exceeded the performance. There was no interactive capability, we depended on rigid concepts of programmed instruction, and there was very little acceptance by the educational community. We will probably look back on those early years as a period of maturing devoted to research and development for instructional computing.

The Broad Context of Educational Computing

The introduction of microcomputers into society during the past few years has been followed with great interest by educators. Now the possibilities which exist for using microcomputers for teaching, learning, and other school-related activities is increasingly referred to as educational computing. This new interdisciplinary area, consisting of the two academic disciplines of Education and Computer Science, is growing steadily. The proliferation of printed matter on the topic (in books and magazines), increased numbers of meetings, conferences, fairs, and conventions, and extensive efforts to develop professional literacy (through seminars, in-service courses, workshops, programs, and even college degrees) all attest to this growing phenomenon. It is impossible to see into the future but many events today point in the direction of continued rapid growth in this new field of educational computing.

Instructional Computing

Instructional computing is the use of computers to facilitate learning. Until educators can point with pride to computer programs and applications which teach, the electronic media will be regarded as having marginal classroom value. Educators on all levels, from nursery schools to post-graduate universities, have the common desire to see the computer used to facilitate instruction. Not just any kind of instruction, but instruction which is motivated, individualized, modularized, and controlled by the learner. Unfortunately, that is not the situation today. Educators have been extolling various forms of insructional computing for many years. Using various terminologies and approaches including Computer Assisted Instruction (CAI), Computer Assisted Learning (CAL), Tutorial Instruction, Mastery Learning, or Diagnostic and Prescriptive Instruction, we are still struggling to achieve proven approaches which are clearly effective.

There is still no widespread acceptance and use of instructional computing. This paper will focus on the problems which have frustrated our attempts to achieve instructional computing. A series of recommendations with rationales will be presented.

Recommendation 1: **WE SHOULD ADAPT THE UNIQUE ATTRIBUTES OF THE MICROCOMPUTER TO THE PROCESS OF TEACHING AND LEARNING.**

We should develop new formats, different approaches, and innovative sequencing of programs based mainly on student needs. Reliance on old patterns of programmed instruction and mainframe approaches should be abandoned. We should be exploring the special capabilities offered by microcomputers including greater interaction, enhanced color graphics, inexpensive light pens or touch sensitive screens for young children, voice input in place of a keyboard (now available from Texas Instrument Corporation), portable computers (i.e., the Radio Shack TRS 80 Model 100), and word processing in every classroom (now available in a full system for under $1000).

Recommendation 2: **WE SHOULD IMPROVE THE QUALITY OF INSTRUCTIONAL SOFTWARE BY INSISTING ON EDUCATIONAL STANDARDS.**

Educational Objectives should be chosen carefully and clearly stated. Unfortunately, many software program modules have been selected exclusively by producers or publishers based on their perception of what will sell. This distorted focus has brought us to a state where games make up the majority of all programming that has been done for children. This situation is causing considerable harm to learners because it deprives them of other important learning experiences. It also demeans the school experience and places the prestige of educational computing in jeopardy. All of this is not to deny the potential

value of games. We must reorder our priorities and assert the need for quality educational software to be developed in order to satisfy our needs on all grade levels, and in all subjects areas and disciplines.

There is also some confusion permeating the marketplace concerning the definition of the word "educational." Many games have been developed for the home market and arbitrarily assigned the description of "educational" in order to heighten the market acceptability of the product. Educators should be aware of this charade and avoid all but those truly educational games and simulations which can assist in the educational process.

We need instructional software which provides the learner with NEW content or skill producing strategies. Modules must be developed which offer planned, sequential, original information. The challenge is to present the information in a motivating, interesting, and meaningful manner. The possibility of providing the material to satisfy different learning styles or variable reading levels should be tried.

All educational software must provide the learner with an emotionally healthy and appropriate environment. Programs which contain violence, destruction, hostility, shooting, bombing, or aggression of any kind as well as personal sarcasm or derogatory remarks of any kind should be eliminated from the classroom. Standards need to be observed in software just as much as in the identification and selection of more traditional instructional materials.

Instructional programs should provide a trail to permit the adult to monitor and review the learner's activities. This trail can help the adult or teacher to better understand and diagnose the learner's patterns of learning.

Every instructional program must be accurate in the presentation of all facts and precise in the use of spelling, grammar, and usage. It is important to recognize that if software is to be taken seriously, it must also be written in a serious manner.

Field Testing should be standardized and integrated into the process of educational software development. Classroom teachers who will be field testing the software should be trained in the process. Procedures used should be shared and improved with the increased use of field testing. The field tests should provide for changes to be made in the field. All programs which complete the field testing should have documentation which describes the test population, the location of the testing, the total number of hours of testing, and the number of people involved in the tests. Planned programs of field testing will undoubtedly improve the quality of final products by taking note of the experiences of the users in the programs.

Heightened Sense Appeal should be incorporated in the preparation of educational software. Greater use should be made of color graphics, movement and action, and sound responses (using earphones). Further research into the use of the computer as a controller of other audio and visual devices should be encouraged and actively supported. The use of the microcomputer with the videodisc continues to be a major hope for developing a new form of individualized interactive media for education.

Learner Control should be provided wherever possible. This should include options in the selection of material, the difficulty of material, the pace of presentation, easy exist from the program, and the ability to continue in a program at a point from which one previously exited. There is no room for programs which do not run, programs which stop when unexpected input is provided, or programs which force learners to go through meaningless experiences. Greater user control should help to eliminate useless workbook type programs.

These and other changes must be made in instructional software in order to serve the learner more effectively. The help of many educators will be required if instructional software is to become a useful, significant, and relevant part of education.

Recommendation 3: **WE SHOULD RESOLVE SOME OF THE AMBIGUITIES OF INSTRUCTIONAL COMPUTING.**

There are numerous issues which represent problems in areas of human decision making, educational values, and politics. These issues are not technical and have little relationship to the problems of computer science. Attention should be given to important educational questions including the following:

Do Video games have any educational value?

What are the values implicit in drill, practice, and review?

How can we rationalize the purchase of hardware that is obsolete from the time it leaves the factory?

Do educational simulations really provide effective learning?

What is an educational game and does it belong in the classroom?

How can computers be used in the assignment and review of homework?

Can instructional programs be developed to encourage cooperation and sharing?

Is the tutorial model of programming the most effective style of teaching and learning?

Will teachers use educational computing for cognitive learning and then restructure class time to develop the interpersonal skills of pupils?

How is the equity issue affecting instructional computing?

Recommendation 4: **WE SHOULD ACTIVELY JOIN WITH ENGINEERS AND COMPUTER SCIENTISTS IN ORDER TO DEVELOP STANDARDS, MODELS, AND PROCEDURES FOR INSTRUCTIONAL COMPUTING.**

Many of the hardware configurations and conventions used in educational computing have simply been "inherited" from established applications in government, business, and industry. It is time for educators to identify their pri-

mary objectives within the broad spectrum of educational computing and work with other interested professionals towards identified goals including:

- Simpler and more effeective authoring languages.
- Greater portabililty of equipment.
- The design of an ideal educational computer for young children.
- Hardware compatibility.
- Software compatibility.
- The expanded use of computers as controllers of other devices (i.e., videodiscs).
- Safeguarding the privacy of personal data in the educational environment.